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TWO NEW SPECIES OF *ANASTREPHA* (DIPTERA: TEPHRITIDAE) WITH ATYPICAL WING PATTERNS

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Abstract.—Two species of the genus *Anastrepha* Schiner with atypical wing patterns are described: ***A. aberrans*** from Rancho Grande, Venezuela, and ***A. freidbergi*** from Pakitza, Peru. A close relationship between *A. freidbergi* and *A. doryphoros* Stone is hypothesized, and the latter species is also redescribed.

Resumen.—Se describen dos especies del género *Anastrepha* Schiner, las cuales presentan patrones alares atípicos: ***A. aberrans*** de Rancho Grande, Venezuela, y ***A. freidbergi*** de Pakitza, Peru. Se propone una hipotesis sobre la estrecha relación entre *A. freidbergi* y *A. doryphoros* Stone, y de esta última se hace también una redescripción.

Key Words: Diptera, Tephritidae, *Anastrepha,* new species, wing pattern, Peru, Venezuela

Anastrepha Schiner is the largest genus of Tephritidae in the New World, including almost 200 species (Norrbom and Kim 1988b), many of which are important fruit pests. Most species have a wing pattern in which three bands, termed the C-, S-, and V-bands by Stone (1942a), are at least partially represented. Two new species with atypical wing patterns are described in this paper. *Anastrepha doryphoros* Stone, to which one of the new species is closely related, also is redescribed in more detail.

Materials and Methods

I follow the morphological terminology of McAlpine (1981) and White (1988), except as noted in Norrbom and Kim (1988a). Acronyms used in the text for the depositories of specimens are as follows: National Museum of Natural History, Smithsonian Institution (USNM); Staatliches Museum für Tierkunde, Dresden (SMT).

Anastrepha aberrans Norrbom, New Species

(Figs. 1A, 2C, 3A, D, G)

Type data.—Holotype ♀ (USNM), VENEZUELA: Aragua: Parque Nacional Henri Pittier, Rancho Grande, 1100 m, 1–5.XI.1966, S. S. & W. D. Duckworth.

Diagnosis.—The lack of a marginal hyaline spot or band at the apex of vein R_1 distinguishes *A. aberrans* from most species of *Anastrepha.* Other species lacking this spot include: some species of the *daciformis* group, which differ from *A. aberrans* in having only 1 orbital seta and the basal third or more of the scutellum orange to brown, distinctly darker than the apex; and *A. bezzii* Lima, species of the *grandis* group (Norrbom 1991), and some specimens of *A. cordata* Aldrich, all of which differ from *A. aberrans* in having a complete S-band that crosses cell dm. In addition to having a complete S-band, *A. castilloi* Norrbom of the *grandis* group, which might be the most

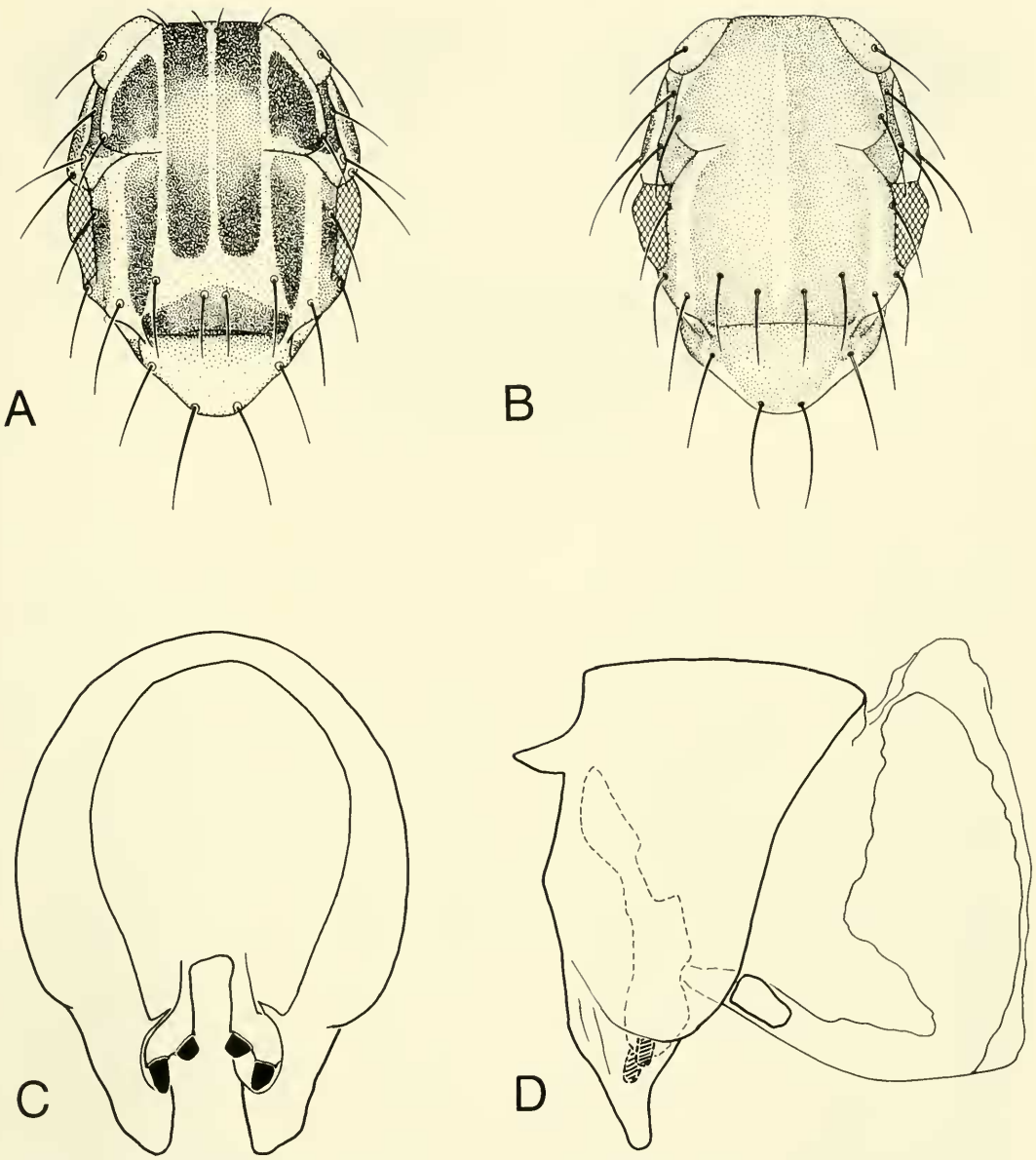

Fig. 1. A–B, Mesonotum, dorsal view; C, epandrium and surstyli, posterior view (setae omitted); D, epandrium, surstyli, and proctiger, lateral view (setae omitted); A, *A. aberrans*; B–D, *A. freidbergi*.

closely related species to *A. aberrans* (see "Remarks"), differs in terminalia length (syntergosternite 7 is 4.49–4.95 mm long, 1.21–1.35 times as long as mesonotum), in the markings of the thoracic pleuron, especially the dark greater ampulla, and in the shape of the medial yellow scutal stripe, which is more gradually expanded posteriorly. On the basis of wing pattern alone, *A. aberrans* might be mistaken as a species of *Toxotrypana* Gerstaecker, but it differs from members of that genus in having vein R_{2+3} nonsinuous, the scutum without a medial furrow, the abdomen non-petiolate, and most head and thoracic setae normal in size.

Description.—Mostly orange to dark

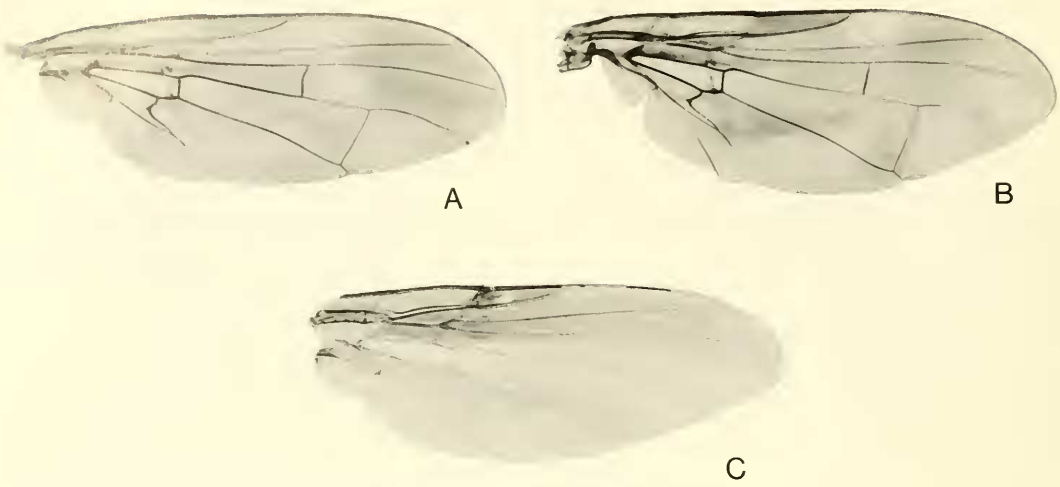

Fig. 2. Wings: A, *A. doryphoros*; B, *A. freidbergi*; C, *A. aberrans*.

brown. Setae blackish. *Head.*—Concolorous orange except ocellar tubercle dark brown and orbital plates blackish from anterior orbital seta to vertex; 2 frontal setae; 2 orbital setae, posterior one strong. Antenna extended 0.85 distance to lower facial margin. *Thorax.*—Mesonotum (Fig. 1A) 4.66 mm long. Scutum entirely microtrichose; mostly orange to dark brown; single distinct yellowish medial stripe from anterior margin to slightly posterior to acrostichal seta, abruptly broadly expanded posteriorly, extended laterally to dorsocentral seta; narrow, distinct yellowish dorsocentral stripe, fused anteriorly with yellowish area along postpronotal lobe and broadly fused posteriorly with medial stripe; distinct yellowish mark extended posteriorly from postpronotal lobe to presutural supra-alar seta; distinct yellowish sublateral stripe from transverse suture to posterior margin, across intra-alar seta; scuto-scutellar suture entirely dark brown, without distinct medial spot. Subscutellum and mediotergite orange-brown, subscutellum narrowly dark brown laterally. Pleura yellowish except oblique dark brown stripe across posterior third of anepisternum, large dark brown spot on posterior half of anepimeron, and moderate brown spot on posterior margin of laterotergite. Katepisternal seta weak, orange, subequal to postocellar seta. *Wing* (Fig. 2C).—Length 12.76 mm. Vein M moderately curved apically; section between bm-cu and r-m 2.32 times as long as section between r-m and dm-cu. Pattern faint orange, its margins diffuse, comprising: broad costal band filling cells bc, c, sc, r_1, r_{2+3}, and br and r_{4+5} anteriorly; and band filling cell bcu and extended broadly, but faintly, along veins A_1 + Cu_2, Cu_1 and dm-cu. Cell bm and anterior half of cell dm hyaline. *Abdomen.*—Tergites unicolorous yellowish brown. *Female terminalia.*—Syntergosternite 7 9.63 mm long; 2.07 times as long as mesonotum. Eversible membrane (Fig. 3A) with dorsobasal scales minute except 10 large hooklike scales in single row, separated from minute basal scales by membranous area; largest scales 0.25 mm long. Aculeus 8.81 mm long; shaft 0.08 mm wide at midpoint, sides parallel; tip (Fig. 3D) 0.51 mm long, 0.08 mm wide, non-serrate, sides slightly convex. Spermathecae (Fig. 3G) globose.

Remarks.—*A. aberrans* may be related to the *grandis* group, and particularly to *A. castilloi* Norrbom, which has a similar pattern of dorsobasal scales on the eversible membrane, with a single complete row of large scales separated from the small basal scales by a membranous area. The scutal color pat-

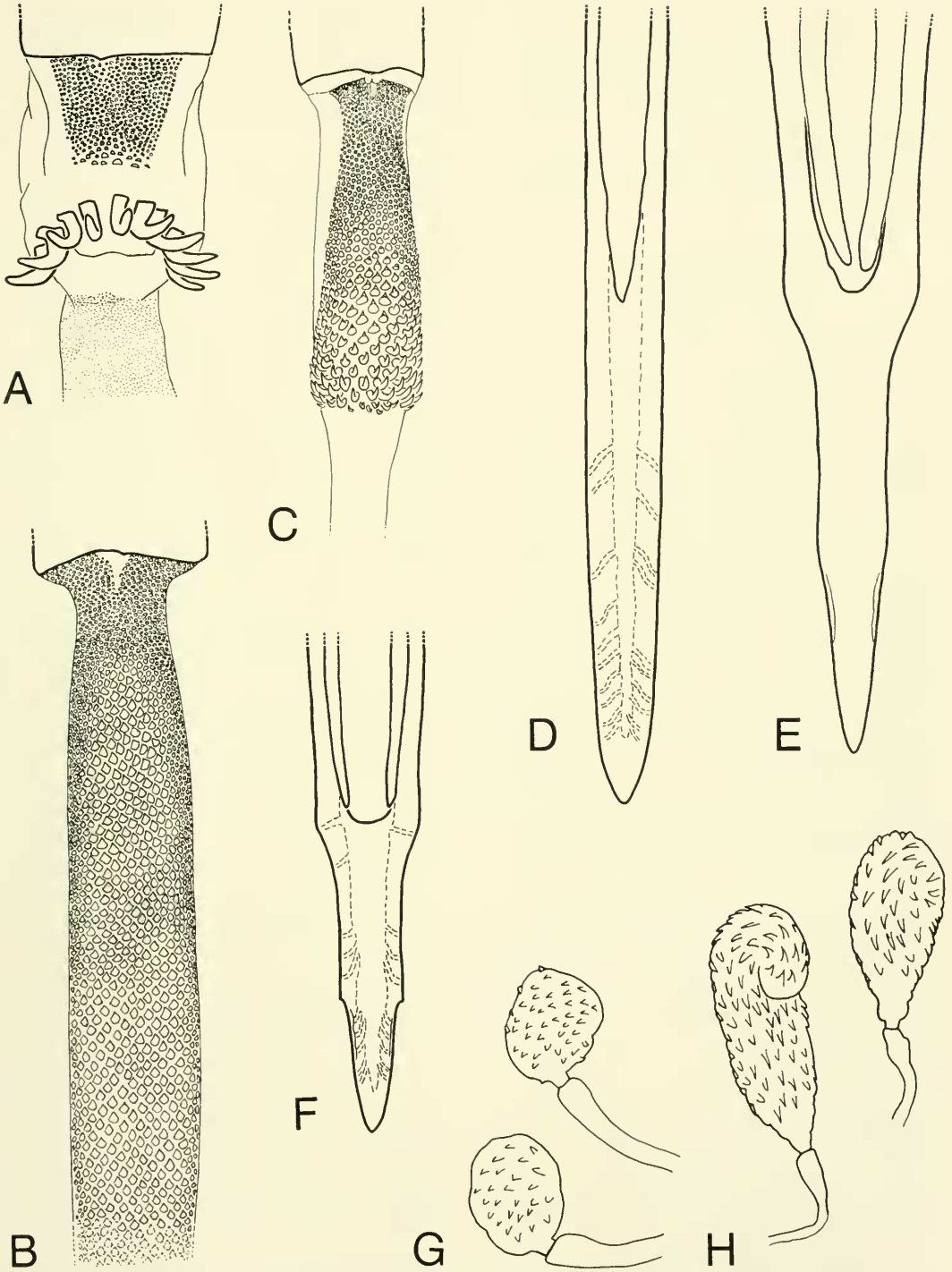

Fig. 3. Female terminalia: A–C, eversible membrane, dorsal view; D–F, aculeus tip, ventral view; G–H, spermathecae (2 of 3 shown); A, D, G, *A. aberrans*; B, E, H, *A. freidbergi*; C, F, *A. doryphoros*.

terns and the shape of the aculeus tip in these two species are also similar (see diagnosis to distinguish these species). Discovery of the male of *A. aberrans* may better clarify its relationships.

Etymology.—From the Latin aberrans (wandering), in reference to the unusual wing pattern.

Anastrepha freidbergi Norrbom, New Species
(Figs. 1B–D, 2B, 3B, E, H)

Type data.—Holotype ♀ (USNM), PERU: Madre de Dios: Manu, Rio Manu, Pakitza, 12°7′S 70°58′W, 250 m, on *Celtis* sp., 16.IX.1988, A. Freidberg. Paratypes: PERU: Madre de Dios: Manu, Rio Manu, Pakitza, 12°7′S 70°58′W, 250 m, 9–23.IX.1988, A. Freidberg, 1 ♀ (USNM). BOLIVIA: Mapiri, Sarampioni, 700 m, I–III.1903, 2 ♂ (SMT) 2 adults without abdomens (SMT, USNM); Mapiri, S. Antonio, 1000 m, 23.II.1903, 1 ♂ (USNM); Mapiri, S. Carlos, 800 m, I.1903, 1 adult without genitalia (SMT).

Diagnosis.—In Steyskal's (1977) key to the species of *Anastrepha, A. freidbergi* runs to *A. doryphoros,* from which it differs as follows: cell r_{4+5} without large subbasal hyaline area but with subapical hyaline area; hyaline spot in cell r_1 not extended to vein R_{4+5}; r-m closer to dm-cu; scutal microtrichia more extensive, submedial bare stripes shorter and more lateral bare areas absent; dorsobasal scales of eversible membrane smaller and arranged in more elongate pattern; and, aculeus tip not narrowed steplike at three-fifths its length. In the male, the posterodorsal margin of the epandrium strongly projects and there are small basal sclerotized areas on the proctiger, characters I have not observed in any other species of *Anastrepha.* They may be unique to *A. freidbergi* or may also occur in *A. doryphoros,* the male of which is unknown.

Description.—Mostly orange to redbrown. Setae redbrown to blackish. *Head.*—Concolorous except ocellar tubercle dark brown; 3–6 frontal setae; 2 orbital setae, posterior one often weak. Antenna extended 0.55–0.65 distance to lower facial margin. *Thorax.*—Mesonotum (Fig. 1B) 3.85–4.74 mm long. Scutum microtrichose except submedial bare stripe slightly lateral to acrostichal seta, narrow except at anterior margin, extended posteriorly at least to level of postsutural supra-alar seta but not beyond midpoint between transverse suture and posterior scutal margin; mostly orangebrown to redbrown; single distinct yellowish medial stripe, narrow posteriorly, not extended laterally beyond acrostichal seta; no dorsocentral stripes; small yellowish area along postpronotal lobe; distinct yellowish sublateral stripe from transverse suture to posterior margin, across intra-alar seta; scuto-scutellar suture without dark brown markings. Subscutellum and mediotergite dark redbrown to brown, usually lighter medially, but not with distinct borders as in *fraterculus* group. Pleura usually undifferentiated except yellowish dorsal anepisternal stripe and moderate brown spot on posterior margin of laterotergite. Katepisternal seta weak, yellowish, subequal to postocellar seta. *Wing* (Fig. 2B).—Length 10.40–12.18 mm. Vein M moderately curved apically; section between bm-cu and r-m 2.44–2.84 times as long as section between r-m and dm-cu. Pattern orangebrown, its margins often diffuse. Cell r_1 with broad semicircular hyaline spot apical to vein R_1 extended only to vein R_{2+3}. C-band and base of S-band broadly fused; cell r_{2+3} entirely infuscated; cell br at most with tiny hyaline area; cell bm and extreme base of cell dm hyaline. Apex of S-band and apical arm of V-bands separated only in cell r_{4+5}. Base of S-band and proximal arm of V-band separated by wedgeshaped hyaline or yellowish area in cell dm, sometimes extended slightly into cell r_{4+5}. *Abdomen.*—Tergites unicolorous orangebrown. *Male terminalia.*—Epandrium produced posterodorsally, angulate in lateral view (Fig. 1D). Outer surstylus

moderately long; in posterior view (Fig. 1C), with outer margin distinctly narrowed from epandrium basally, slightly and unevenly tapered to blunt apex; mesal margin almost straight or slightly convex. Proctiger with distinct lateral fold; sclerotized parts narrowly connected; small area near base strongly sclerotized. Aedeagus 21.50–22.70 mm long; 5.00–5.71 times as long as mesonotum. Distiphallus 0.50–0.55 mm long; endophallic sclerite strong, stout and distinctly convoluted apically. *Female terminalia.*—Syntergosternite 7 13.83–14.65 mm long; 2.92–3.12 times as long as mesonotum; basal lateral lobes separated from main sclerite by membranous area. Eversible membrane (Fig. 3B) with dorsobasal scales all small, largest 0.05 mm long, triangular and projected, but not hooklike; scales extended to 5.0 mm from base of membrane, gradually decreased in size to spicules. Aculeus (dissected only in paratype) 12.34 mm long; base slightly expanded; shaft 0.15 mm wide at midpoint; tip (Fig. 3E) 0.49 mm long, 0.14 mm wide, non-serrate, tapered rapidly subbasally, then parallel sided, then gradually tapered, without step, at about three-fifths distance to apex. Spermathecae (Fig. 3H) ovoid to elongate ovoid.

Remarks.—This species and *A. doryphoros* form a monophyletic group characterized by the following synapomorphies: scutum with submedial nonmicrotrichose stripe; S- and V-bands fused basally and apically in cell r_{4+5} (occurs convergently in *A. obscura* Aldrich); dorsobasal scales of eversible membrane reduced in size but distributed in elongate pattern (a similar pattern occurs convergently in *A. bezzii*); aculeus tip tapered, parallel sided, then tapered. Their relationship among the other species groups of *Anastrepha* is unclear, except that they belong to the large group of species groups which have a distinct lateral crease in the proctiger.

The wing pattern of *A. freidbergi* is intermediate between the normal *Anastrepha* pattern and that of *A. doryphoros,* whereas the scales of the eversible membrane are less reduced in *A. doryphoros* than in *A. freidbergi.*

Etymology.—This species is named for the collector of the holotype, Dr. Amnon Freidberg.

Anastrepha doryphoros Stone
(Figs. 2A, 3C, F)

Anastrepha doryphoros Stone 1942b: 299 (description); Foote 1967: 10 (catalog); Steyskal 1977: 4 (in key); Norrbom and Kim 1988b: 5 (in classification).

Type data.—holotype ♀ (USNM), PANAMA: El Cermeño, 5.XII.1939, J. Zetek, Z-4600; USNM Type No. 56318; ovipositor mounted on slide 40.I.11a, wing on slide 40.I.11b. I added a holotype label.

Description.—Mostly light orangebrown. Setae blackish. *Head.*—Concolorous except ocellar tubercle dark brown; most head setae lost on holotype, but 3 sockets for frontal setae, 2 for orbital setae, size of socket for posterior seta indicates it was well developed. Antenna extended 0.63 distance to lower facial margin. *Thorax.*—Mesonotum 3.55 mm long. Scutum microtrichose except submedial bare stripe slightly lateral to acrostichal seta, narrow except anteriorly, extended posteriorly to level of dorsocentral seta; triangular presutural lateral bare area; and small bare stripe between dorsocentral and intra-alar setae on posterior quarter. Scutum mostly light orangebrown; single distinct yellowish medial stripe, narrow posteriorly, not extended laterally beyond acrostichal seta; no dorsocentral stripes; small yellowish area along postpronotal lobe; distinct yellowish sublateral stripe from transverse suture to posterior margin, across intra-alar seta; scuto-scutellar suture without dark brown markings. Subscutellum and mediotergite entirely light orangebrown. Pleura undifferentiated except yellowish dorsal anepisternal stripe. Katepisternal seta

weak, yellowish. *Wing* (Fig. 2A).—Length 9.80 mm. Vein M moderately curved apically; section between bm-cu and r-m 1.79 times as long as section between r-m and dm-cu. Pattern orangebrown, diffuse. Cell r_1 with broad semicircular hyaline spot apical to vein R_1 extended to vein R_{4+5}. S-band not recognizable, broadly fused to C-band basally and to V-band apically and in cell dm, and almost interrupted along vein R_{4+5}; cell br, cell r_{2+3} basal to r-m, and cell dm, except extreme base, infuscated; cell r_{2+3} and r_{4+5} infuscated apically, but r_{4+5} with large subbasal hyaline spot; cell bm hyaline. *Abdomen.*—Tergites unicolorous yellowish brown. *Female terminalia.*—Syntergosternite 7 8.60 mm long; 2.42 times as long as mesonotum; basal lateral lobes small, connected normally to main sclerite. Eversible membrane (Fig. 3C) with dorsobasal scales increased in size until 1.08 mm from base, then abruptly reduced to minute spicules, largest scales 0.09 mm long, cylindrical and hooklike. Aculeus 7.50 mm long; base slightly expanded; shaft 0.12 mm wide at midpoint; tip (Fig. 3F) 0.33 mm long, 0.11 mm wide, non-serrate, tapered rapidly subbasally, then parallel sided, with distinct step at about three-fifths distance to apex, then gradually tapered. Spermathecae not examined.

Remarks.—Stone (1942b) described the aculeus tip of the holotype as having minute serrations, but his figure does not show them and I was unable to observe any using a compound microscope.

Specimens examined.—Holotype.

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